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ORIGINAL RESEARCH

Evaluation of the SnapChat mobile social networking application for breast cancer awareness among Saudi students in the Dammam Region of the Kingdom of Saudi Arabia

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Turki M Alanzi
Alanoud Alobrah
Reem Alhumaidi
Shahad Aloraifi

Health Information Management and Technology Department, College of Public Health, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Purpose: The main aim of this study was to investigate the feasibility and the effectiveness of the SnapChat social networking mobile application in increasing the awareness of breast cancer among the Saudi female students in the Dammam region of Saudi Arabia.

Patients and methods: An intervention study was carried out with 200 participants divided among 2 groups: a control group and an intervention group. The control group did not receive any awareness materials, and the intervention group received awareness about breast cancer through SnapChat using videos, texts, and pictures. A questionnaire-based survey was conducted at the beginning and at the end of the study to assess the change in the awareness among the participants.

Results: A significant improvement in the breast cancer awareness was found in the intervention group with P=0.001. The mean knowledge was found to be increased from 8.7±2.8 to 14.8±3.01 (mean ± SD).

Conclusion: The SnapChat mobile social networking application can be effectively used in creating breast cancer awareness among the Saudi population.

Keywords: breast cancer awareness, social networking, mammogram, SnapChat

Introduction

Breast cancer is one of the most serious health-related concerns being faced by many people across the world. According to cancer statistics, it is observed that throughout the world, particularly in the United States of America and Saudi Arabia, the most common type of cancer found in women is breast cancer.[1–3] With regard to the world statistics for the year 2012, it is possible to postulate that 1,671,000 new cases of breast cancer were diagnosed among women worldwide.[1] This number accounts for 25% of all the cancers observed and indicates that breast cancer is the second most common cancer in the world and the fifth cause of cancer death with 522,000 deaths in 2012.[1] With regard to the United States of America, the statistical projections for the year 2017 indicate that from a total of 1,688,780 cancer cases diagnosed, ~15% corresponded to breast cancer in women.[2] With respect to Saudi Arabia, the cancer statistics show that 1,826 cases of breast cancer were detected among Saudi women in the year 2014. This figure represents 28.7% of all cancers diagnosed in women and 15.9% of all observed cancers.[3] In addition, breast cancer ranked first among all types of cancer diagnosed in 2014.[3] Other recent studies suggested that there is an increase in the prevalence of

Correspondence: Turki M Alanzi
Department of Health Information Management and Technology, College of Public Health, Imam Abdulrahman Bin Faisal University, 2835 King Faisal Road, Dammam 31441, Saudi Arabia
Tel/fax +966 13 333 2703
Email talanzi@iau.edu.sa

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breast cancer in Saudi Arabia.[4–6] Other details about breast cancer, such as the general characteristics, signs, risks, diagnosis, and treatment, can be found elsewhere.[7–11]

In conjunction with rising breast cancer cases, the country of Saudi Arabia has seen rapid changes across mobile and internet platforms that can be used for increasing health awareness and for providing remote medical care.[12,13] The number of internet and smartphone users in Saudi Arabia is increasing rapidly. Currently, there are 15.9 million smartphone users in the country, and this number is expected to reach 19.1 million by 2019.[14] The urge for new mobiles and latest technologies in Saudi Arabia is very high. It was found that the time spent on watching a video on mobile was 62% in Saudi Arabia, which is significantly high when compared with countries like UAE, UK, and Germany.[15] A recent study has revealed that about 66% of participants stated that they access internet many times throughout the day on their mobiles and 54% of them stated that internet is their main source of news and entertainment.[15] Taking into account these factors, internet technologies can be an effective agent in developing a system for creating awareness about breast cancer in Saudi Arabia.

The increase in the number of smartphone users boosted the use of social networking applications in the Saudi Arabia region, and social networking is also becoming increasingly popular in the country. The most popular social networking applications used in the country include Facebook, WhatsApp, Skype, SnapChat, LinkedIn, and so on. SnapChat has become increasingly popular for sharing videos, pictures and text messages, with a penetration rate of 13% in Saudi Arabia.[16] A recent study has revealed that about 26% of the Saudi teenager's use SnapChat, placing the country in the eighth position globally in the number of SnapChat users.[17] The study has also revealed that about 33% of the SnapChat users daily allocate 2 hours for the application and 29% of the users allocate 1 hour daily.

Various studies have been carried out and are being conducted to implement these technologies in providing medical education and health care facilities due to the observed positive results.[18–20] Also, several research studies demonstrate that social media and mHealth and eHealth technologies are effective tools for cancer patient education, support, prevention, management, and treatment.[21–27] For example, a survey indicated that the social media app Twitter is an effective tool to improve the education and support of breast cancer patients.[21] Similarly, some literature reviews reported the extensive use of Twitter, Facebook, mobile phones, and other social media and mhealth technologies for the education, prevention, treatment, and management of cancer.[22–25] Another study investigated the use of mobile phones to increase knowledge about cancer.[26] In addition, a recently published book presents an extensive analysis of the fundamentals and applications of mHealth technologies, including the management of chronic diseases such as cancer, among others.[27]

Despite these studies, to date, no research has been conducted in Saudi Arabia focusing on creating awareness about breast cancer using mobile technologies.

Recognizing the seriousness of the disease and rising cases, there is a need for extensive research in this area for the application of the latest technologies like mHealth, social networking, and others in creating awareness about the disease, diagnosis, and treatment procedures in Saudi Arabia.

Considering the increase in the number of smartphone and SnapChat social networking users, this study investigated the feasibility and the effectiveness of using the SnapChat mobile application as an intervention tool for creating awareness about breast cancer among Saudi female students in the Dammam region of Saudi Arabia.

Patients and methods

Study setting and participants

In order to assess the impact of the SnapChat mobile application in creating awareness about breast cancer, an intervention study involving female student participants from the Dammam region, in the Eastern Province of Saudi Arabia, was conducted.

In this study, the SnapChat mobile application was used as an intervention tool for spreading awareness information to the participants. The intervention group used the SnapChat mobile application and received breast cancer awareness information on their mobiles, which included communication of knowledge about breast cancer, its symptoms, diagnosis process, the treatments available, and so forth. In particular, during the intervention process, participants received posted information about the following questions: What is breast cancer? What are the signs and symptoms of breast cancer? How can we detect cancer in early stages? How is breast cancer self-examined? What is a mammogram? Which are the risk factors? How and which are the ways to treat breast cancer? How do we prevent breast cancer? How can we help and support the patient? What is the role of family and religious support? What are the false beliefs exchanged between women and rumors about breast cancer?

Also, the participants learned how to use the SnapChat mobile application to ensure that they received and read the information on the intervention material. This was shown in the SnapChat app.

The awareness materials developed by the specialist doctors and the Saudi Cancer Foundation were delivered in Arabic language. The intervention program lasted 4 weeks, and 3 interventions were posted every week. The control group was excluded from the awareness program and did not receive any information about breast cancer awareness through SnapChat.

Data collection

This study used the survey as the strategy for collecting the data required for evaluating the awareness program. The survey questionnaire included 18 questions, which represent general information about breast cancer and was adopted from the United Kingdom Cancer Research, and it was translated into Arabic. The questions included were designed to test the basic knowledge about breast cancer. The participants were supposed to select as the answer 1 option, from the 3 options provided. The answers included the options "yes," "no," and "I don't know." The right answers to the questions were given a score of 1, while the wrong answers and the responses of "I don't know" given 0 scores.

The survey had to be completed by all the participants in both groups before starting the trial. The same survey was again required to be filled by all the participants of both groups after the completion of the 4-week intervention study. Then, the results were analyzed by comparing the scores of the intervention and control groups. By using a statistical analysis, the results from both surveys were compared, observing the changes in the awareness levels.

By means of the survey, the awareness outcome that was compared was the knowledge about breast cancer.

Sampling

The participants were informed about the study aims and objectives through e-mail, and the interested candidates were asked to attend the recruitment drive organized at the University of Dammam. Initially, the students from the university were contacted through e-mail, and to increase the sample size, the snowball sampling technique was adopted.[28] The participants were requested to forward the e-mail to other students who could be their friends from other colleges in the region.

The estimated sample population was 180, but the sample was increased to 200 to allow for dropouts or withdrawals. About 270 students attended the recruitment drive, out of those 200 were selected. The participants were divided into 2 groups: a control group and an intervention group. The participants who were using the SnapChat application on their mobiles were randomly allocated to the intervention group, and all others were allocated to the control group. The participants were equally allocated among the intervention group (n=100) and the control group (n=100). The participants were informed about the aims and objectives of the study before the trial, and an informed consent was signed by all the participants. Ethical approval was obtained from the Institutional Review Board (IRB) of the University of Dammam with number IRB UGS 2015-03-233.

Inclusion and exclusion criteria

The inclusion criterion was female students from the Dammam region.

The exclusion criterion was females who are not students in the Dammam region.

Statistical analysis

The Statistical Package for Social Sciences version 24 (SPSS Inc., Chicago, IL, USA) was used for the data analysis. The scores of the participants of the control and the intervention groups were considered as the primary outcome. Both paired and unpaired *t*-tests were used for hypothesis testing in analyzing the differences in various metrics between the 2 groups. Independent comparison was made at the end of the study to identify the change in both groups before and after the study. The results were considered significant if the probability $P<0.05$. The effect size using Cohen's *d* index was also calculated to estimate the practical improvement in students' knowledge.[29]

Results

A total of 191 participants completed the study with 9 dropouts. Among the participants, 96 in the intervention group (n=96) and 95 in the control group (n=95) completed the study. The comparison of the demographic information of the participants at the baseline using the Fisher's exact test is presented in Table 1. In this table, the variables, the number and the percentage of the participants of both groups, and the probability value *P* are presented. The variables are age, education, and previous history of cancer. Only 2 participants in the intervention group were previously diagnosed with cancer.

To compare the scores of each group before and after the study, the paired *t*-test was used. The results of the test are shown in Table 2. This table displays the outcome measures, the mean, the mean difference, the SD with the corresponding probability value *P* for each group, and the effect size of the change in breast cancer awareness within each group.

Table 1 Baseline demographic and clinical characteristics of study groups with Fisher's exact test

Variables	Control group (n=95)	Intervention group (n=96)	*P*-value
Age			0.1
≤35 years	95 (100%)	94 (98%)	
≥36 years	0 (0%)	2 (2%)	
Education			0.3
Primary school	5 (5.2%)	5 (5.2%)	
Secondary school	57 (60%)	64 (66.6%)	
University	33 (34.7%)	27 (28.12%)	
History of cancer			0.1
Yes	0 (0%)	2 (2%)	
No	95 (100%)	94 (98%)	

Also, the pre and post mean differences of the control and intervention groups were assessed using the unpaired *t*-test. The results of the study are described in Table 3. This table presents the outcome measurement, the number of participants (n), the mean, the SD, the *t* value, the corresponding probability *P* for each group, and the effect size of the difference in the level of awareness between both groups at the end of the study.

The change or increase in the breast cancer awareness can be better understood by analyzing the mean scores and mean differences between both groups at the end of the study. This information is presented in Figure 1.

Table 2 Comparing pre and post breast cancer knowledge with paired *t*-test

Group	Outcome measures	Mean ± SD	Mean difference ± SD	*P*-value	Effect size (95% CI)
Control group	Pre-study	5.1±1.6	–0.02±0.02	1.00	0 (–0.28 to –0.28)
	Post-study	5.1±1.6			
Intervention group	Preintervention	8.7±2.8	–6.1±0.1	0.001	2.1 (1.7 to 2.5)
	Postintervention	14.8±3.01			

Table 3 Comparing pre and post breast cancer knowledge with unpaired *t*-test

Group	Outcome measures	N	Mean	SD	*t*-value	*P*-value	Effect size (95% CI)
Control group	Prestudy	95	5.1	1.6	0.0000	1.0000	4.1 (3.5–4.5)
	Poststudy	95	5.1	1.6			
Intervention	Preintervention	96	8.7	2.8	14.56	0.0001	
group	Postintervention	93	14.8	3.0			

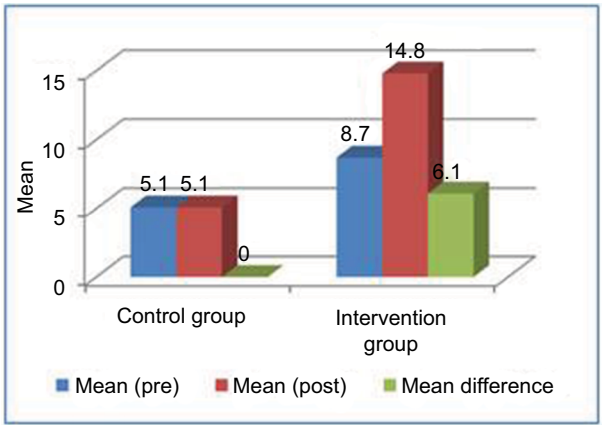

Figure 1 The mean and mean differences between both groups.

Discussion

In relation to this research, the present work analyzes the feasibility of using the SnapChat social networking mobile application for creating awareness about the breast cancer in Saudi Arabia. As previously explained, an intervention study was carried out with female students from the Dammam region, in the Eastern Province of Saudi Arabia. The intervention group received breast cancer awareness through the SnapChat mobile application, and the control group did not receive any information about breast cancer awareness through SnapChat. Statistically, according to the results of the *t*-test shown in Table 1, there were no significant differences between the control and intervention group in demographic or clinical characteristics.

It is necessary to point out that when analyzing the breast cancer awareness reached by both groups during the intervention study, using the paired *t*-test presented in Table 2, it was found that prior to the study, the intervention group obtained a total score of 8.7 and the control group achieved a score of 5.1. This reflects that, before the study was carried out, the intervention group had more awareness about the breast cancer than the control group. But, after the intervention study, the score of the control group remained the same, while the score of the intervention group increased significantly to 14.8. At the baseline, the awareness of the intervention group before the study was 8 (SD=2.8), but after the intervention study rose notably to 14 (SD=3.01). The change in the awareness noticed in the intervention group using the paired *t*-test was highly significant as the *P*-value was 0.001 ($P<0.5$). Similarly, the pre and post mean differences of the control and intervention groups were assessed using the unpaired *t*-tests. For the intervention group, after the study, the *t* value was found to be 14.56, and a significant change was observed in the mean and SD, which implies a significant increase in the breast cancer awareness among the intervention group participants. For the control group, no changes were observed. Also, as displayed in Figure 1, there is a significant mean difference score in the intervention group when comparing the scores before and after the study. This notable difference points out that there is an increase in the breast cancer awareness among the participants of the intervention group. In the control group, no difference before or after the study was observed. In the same way, the Cohen's *d* index values listed in Tables 2 and 3 suggest that there is an effect size. The effect size for the change in the awareness level within each group is shown in Table 2, and the effect size for the difference between the 2 groups at the end of the study is displayed in Table 3. These results indicate that the SnapChat social networking mobile application can be used effectively in Saudi Arabia to create awareness about the breast cancer.

With the increasing advances in the fields of technology, literature, and research, the possibilities of examining the different cases of cancer diseases have increased and can be efficiently performed through various research tools. There are several reviews that focus on assessing the level of awareness of breast cancer among the Saudi population. These works have been conducted in various regions of Saudi Arabia. In a recent study carried out in the Northern region of Saudi Arabia, it was found that about 50% of the participants indicated that among the people they knew who had breast cancer, the disease was found at a late stage, and 50.1% of the participants did not practice breast self-examination due to fear, and the majority of the participants had very low awareness about breast cancer.[30] Another study conducted in the Taif region in Saudi Arabia has reported that 93.3% of the participants surveyed had good knowledge about risk factors of breast cancer and 87% were aware of breast self-examination. However, the knowledge about treatment procedures like a mammogram or clinical breast examination was very low.[31]

Other studies carried out in the Southwestern region of Saudi Arabia, Jeddah, and the systematic review of the breast cancer awareness in Saudi Arabia revealed the same outcome: the low awareness about breast cancer among the surveyed participants.[32–35] In this sense, the pre-study results of the control and intervention group of this study also indicate the same findings, as the scores are comparatively low. However, there are differences in the level of awareness among the people in different regions, and the most important thing is that no studies have observed the impact of mobile social networking tools in increasing the awareness. One study was found focusing on developing and using the social network services for creating breast cancer awareness employing a web application instead of a mobile application. The findings of this study indicated a significant change in the awareness levels of the participants.[36] Similarly, the results of the present work using SnapChat have shown analogous results. In this sense, both studies support the idea that social networking is an effective tool in creating awareness about breast cancer. In general, the results of this research are in agreement with the findings of several works related with the application of social media and eHealth and mHealth technologies for cancer education, prevention, support, management, and treatment.[21–26]

From the studies highlighted, there are 2 points that need to be emphasized. The first is the low level of awareness

among the Saudi population about breast cancer, and the second point is that the level of awareness varies from region to region. Therefore, it is necessary to have an effective and efficient approach to increase the knowledge of the people and the ability to have a good impact irrespective of the region. Considering these factors, social networking mobile applications, especially SnapChat, can be used widely in the country to create awareness. Identifying the importance of social networking, there are programs like "10KSA" which actively uses the social networking applications in promoting and creating awareness about breast cancer in Saudi Arabia.[37]

Finally, from a practical point of view, the implications for education and cancer prevention using the SnapChat mobile application require an in-depth knowledge of this platform and a permanent bidirectional communication between the medical staff and the participants. In this sense, it was necessary for participants to follow the instructions, read, and think through carefully about the posted intervention materials. Also, the participants asked questions when they did not understand any of the posted topics. It can be concluded that these are general requirements in the application of social media and eHealth and mHealth technologies for cancer prevention, education, treatment, management, and support.[21–26]

Limitations

This study presented several limitations. First, the fact that the participants were invited to the recruitment campaign could indicate that they were highly motivated and different from the general population. Second, the students were not randomized in the intervention and control groups, which may imply some problems of internal validity. Third, although there was an improvement in the knowledge of breast cancer in the intervention group, it is not clear if this will result in a change in decision-making and in future behavior. Fourth, we are not sure if the knowledge acquired during the intervention will persist over time. Finally, another of the limitations of this work was the short duration of the intervention study and the small number of participants used in the survey. In this regard, in future studies, it will be necessary to increase the time of the intervention study and the sample size employing a similar approach to investigate the impact of Snaptchat to increase breast cancer awareness among people in different regions of Saudi Arabia.

Conclusion

Although breast cancer is one of the most serious health care concerns being faced in Saudi Arabia and the prevalence of the breast cancer is increasing in the region, there were no studies found for developing solutions to create breast cancer awareness in the country. In this sense, the present study addresses this problem and demonstrates that the SnapChat social networking mobile application can be effectively used for increasing the awareness about breast cancer in Saudi Arabia. The results of the survey highlight the significant increase in the awareness achieved by using SnapChat among the participants of the intervention group. This indicates that the mobile social networking applications can be effectively used in various health care services, as is evident from the various health care systems launched in different regions across the world.

Disclosure

The authors report no conflicts of interest in this work.

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